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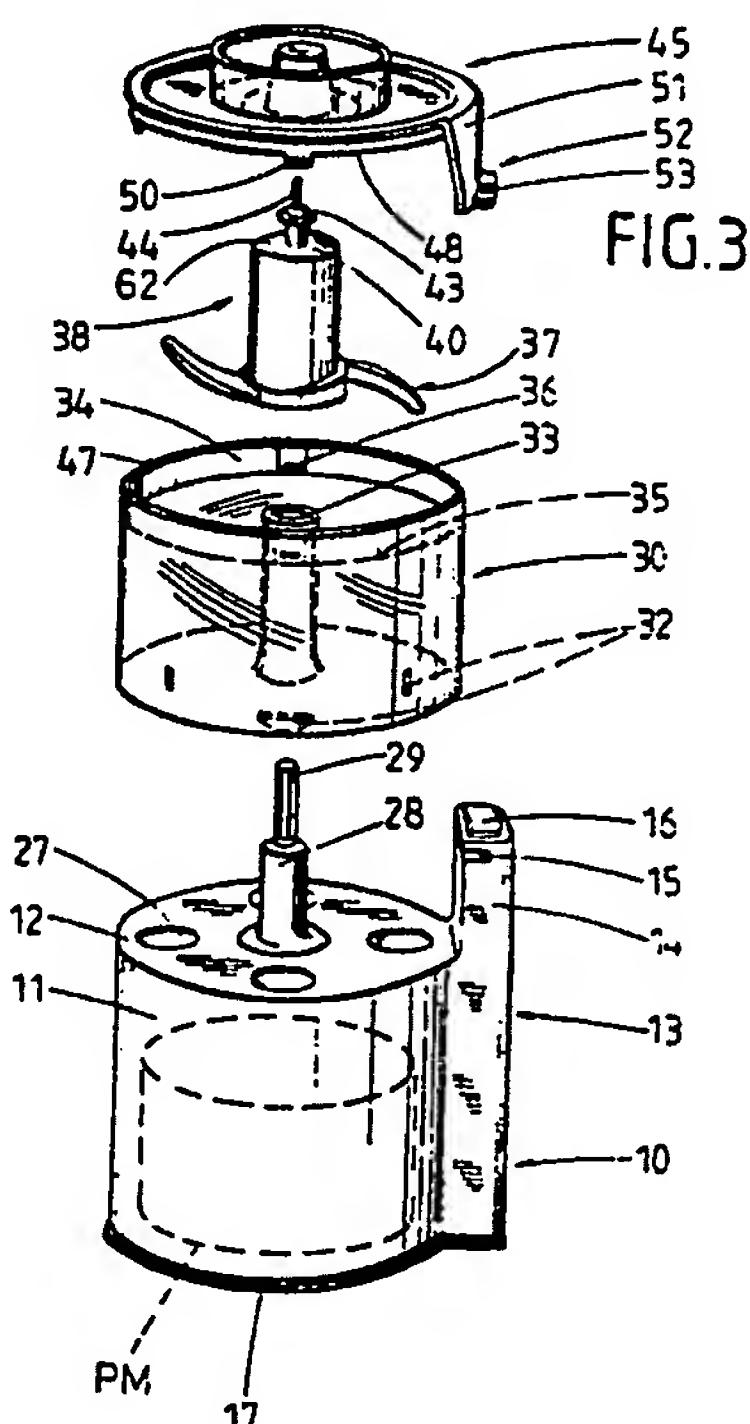
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## (54) Food processor

(57) A compact food processor has a housing (10) containing an electric motor (PM) and carrying a detachable bowl (30) on its upper face. The bottom wall of the bowl (30) is separably but non-rotatably coupled to the top wall (12) of the housing (10), by means of projections (32) on the bottom wall engaging sockets (27) in the top wall (12). The top of the bowl (30) can be closed by a cover (45) turnable so that a releasing element (53) on its arm (51) frees a knob (16) to start the motor. The housing (10) is closed by a detachable closure which stores the motor cable. The knob only when the bowl (30) is properly coupled to the housing (10) and the cover (45) is properly connected to the top of the bowl (30). The cover (45) carries a small receptacle for flowable material.



GB 2 238 466 A

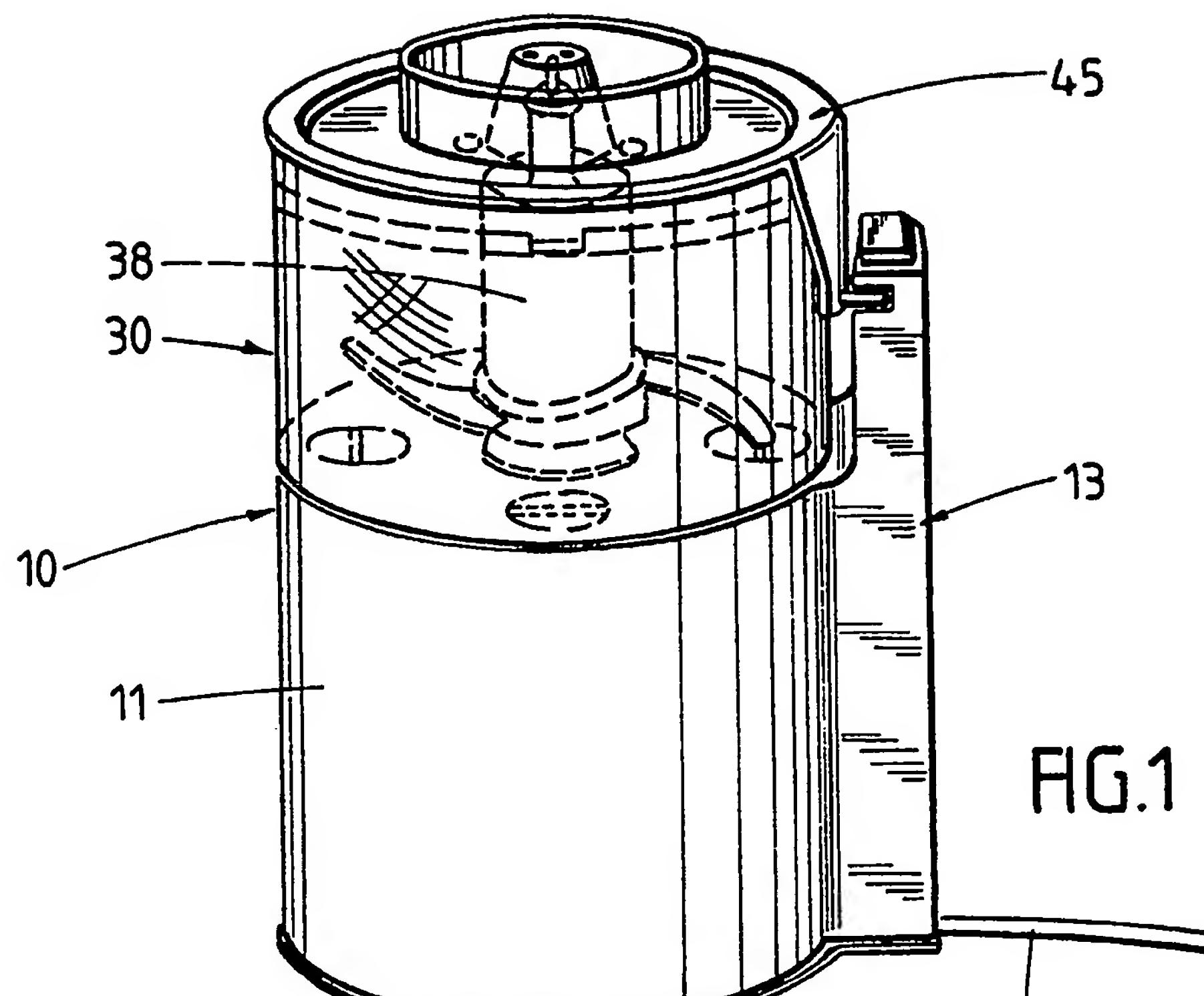


FIG.1

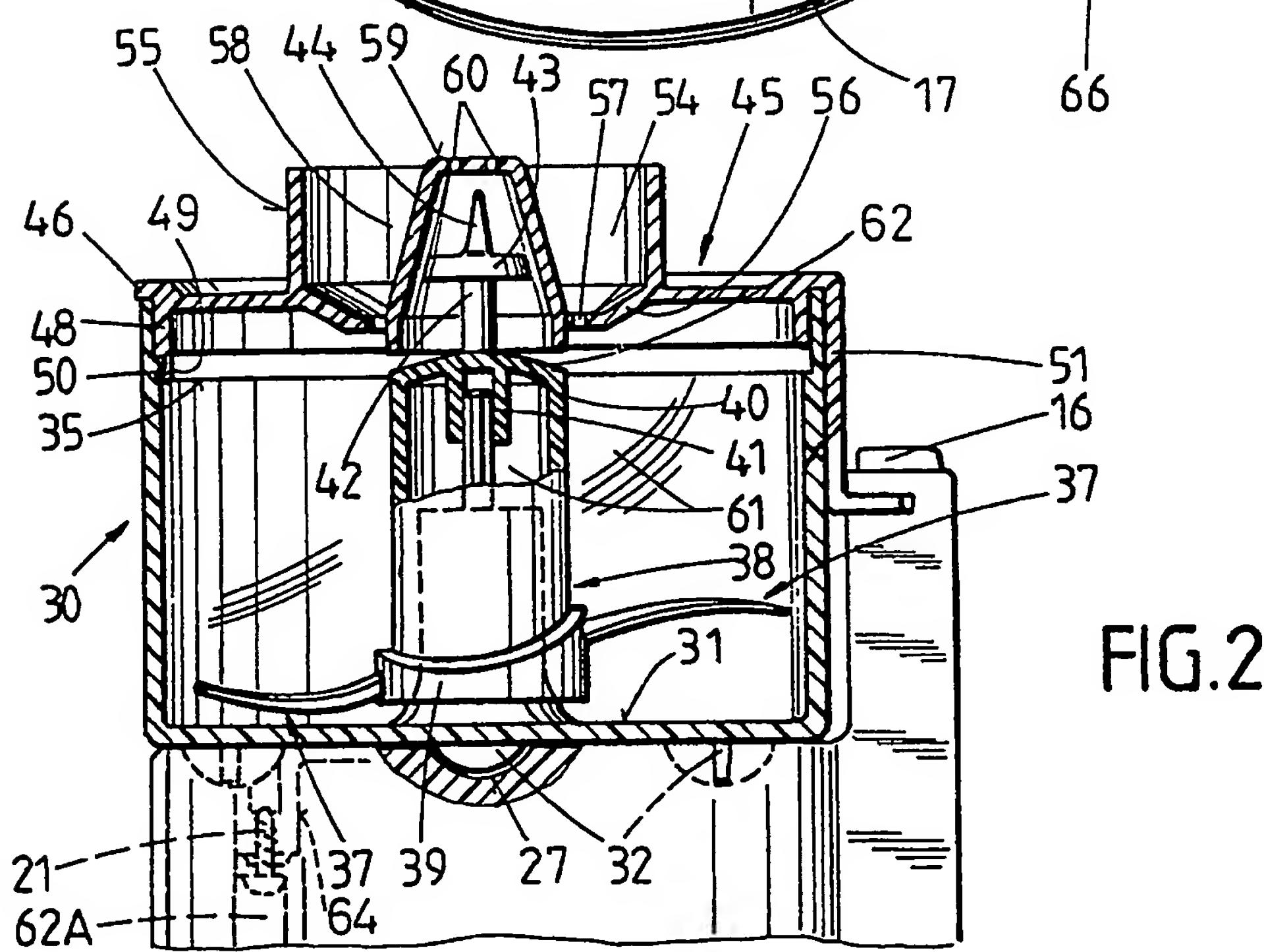
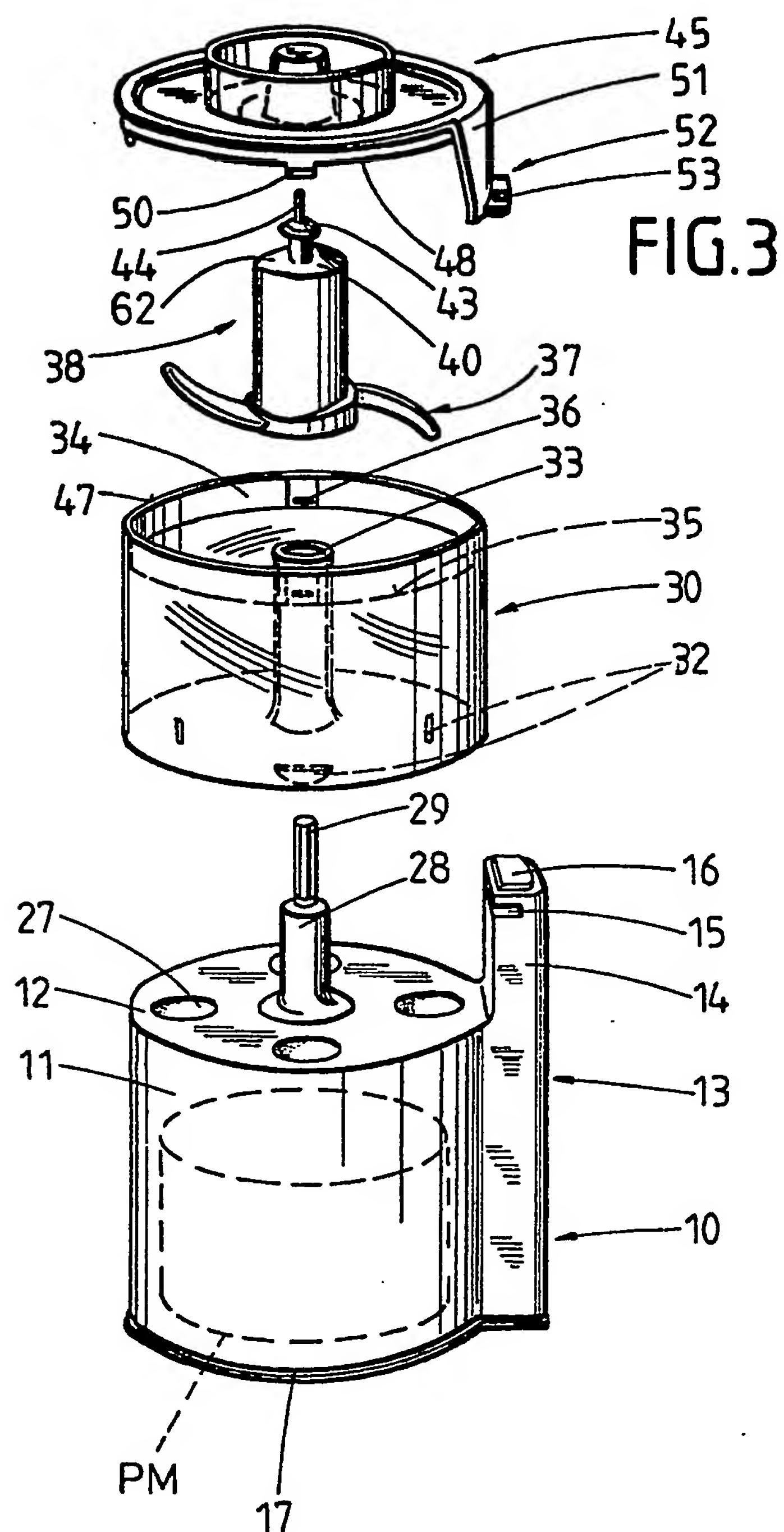


FIG.2



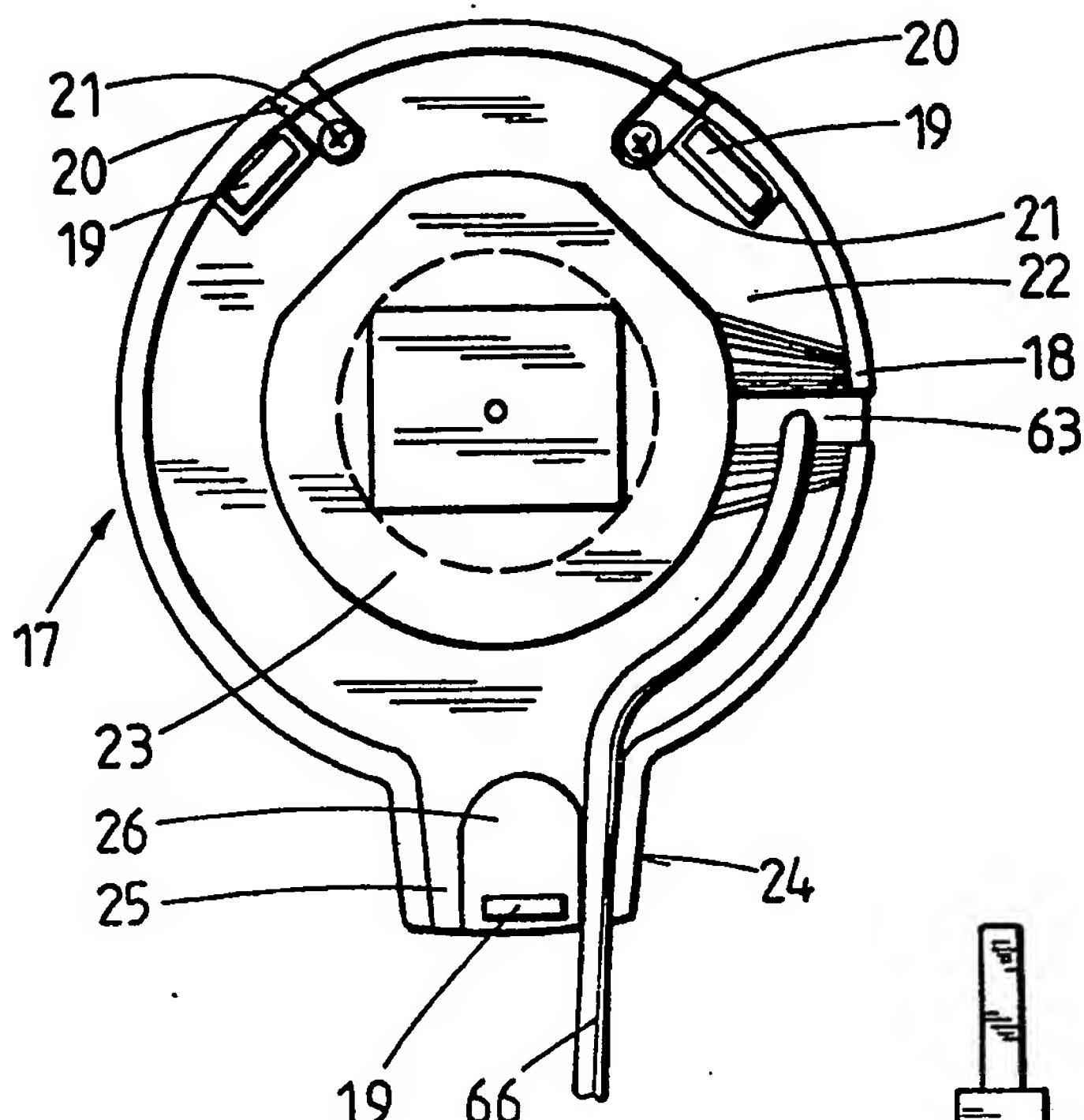


FIG.4

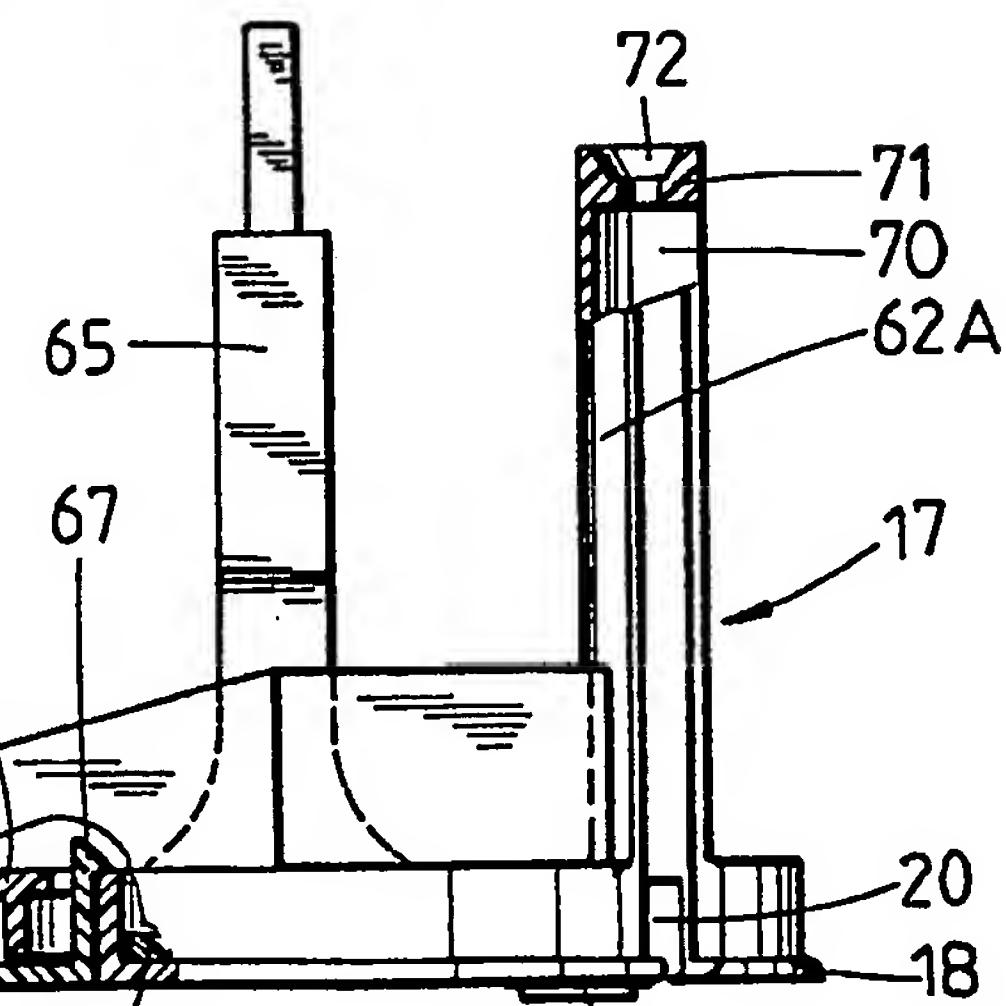


FIG.5

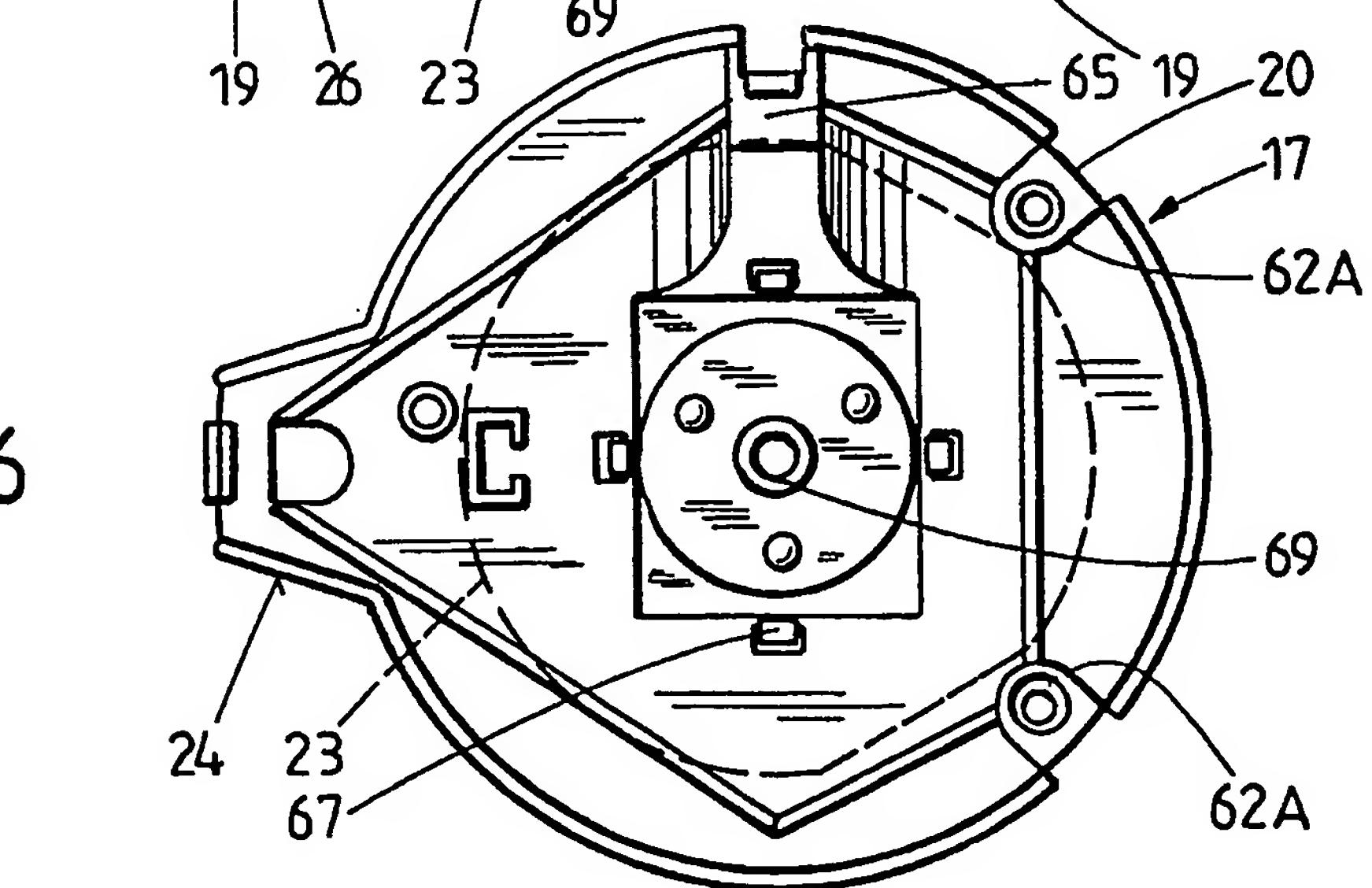


FIG.6

FOOD PROCESSORS

The invention relates to food processors in general, and more particularly to improvements in food processors of the type wherein 5 batches of foodstuffs are to be comminuted, mixed and/or otherwise treated in the interior of a bowl or a similar vessel.

A first category of presently known food processors includes appliances which are designed for the processing of large quantities of foodstuffs and can be used with advantage in restaurants, school 10 kitchens, hospital kitchens and similar establishments.

As a rule, such appliances are supplied with a variety of mixing, stirring, comminuting, kneading, whipping and/or other tools which can be used interchangeably. It is also known to furnish such appliances with adapters which can be separably coupled to the output shaft of an 15 electric motor or other prime mover and can accept and transmit torque to one or more tools including knives, stirring implements, whipping implements and/or others. Reference may be had, for example, to commonly owned U.S. Pat. No. 4,669,672 granted June 2 1987 to Hubert Fuhner et al. for "Food processor", to commonly owned U.S. Pat. No. 20 4,700,903 granted October 20, 1987 to Stephan Henn for "Food processor with adapters for transmission of torque to rotary tools", and to commonly owned U.S. Pat. No. 4,744,522 granted May 17, 1988 to Michael Borgmann et al. for "Food processor with juice extractor".

Another category of presently known food processors includes 25 small appliances which are primarily (but not exclusively) intended for use in domestic households and are designed to comminute, mix, homogenize and/or otherwise treat relatively small quantities of foodstuffs. As a rule, such small appliances are supplied with a single tool or with two or more tools of a single type, e.g., with a 30 first tool having one knife and with one or more additional tools having two or more knives. Appliances of such character are known as mini processors and can be used, for example, for the comminuting of relatively small quantities of parsley, onions, garlic, fruits, vegetables, lean meats, nuts, chocolate, biscuits, pieces of bread and 35 many others. As a rule, the vessel for confinement of foodstuffs to be treated is disposed directly above the housing for an electric motor or another prime mover which can be started to rotate the tool in the

vessel. The vessel is separably coupled to the housing by one or more tongue-and-groove connections. Furthermore, such appliances are equipped with safety features which prevent the operator from starting the prime mover until and unless the open top of the vessel on the 5 housing for the prime mover is properly closed and sealed by a detachable cover. The heretofore known couplings and safety features are complex and expensive; they contribute significantly to the cost of such appliances, not only as concerns the making and finishing of parts but also as concerns the assembly of such parts.

10 According to one aspect of the invention there is provided a food processor comprising a housing including a top wall having an upper side; a prime mover disposed in the housing and having a rotary output element extending through and upwardly beyond the top wall; a food-receiving vessel having a bottom wall adjacent the top wall, the bottom 15 wall having an opening for the output element and an underside adjacent the upper side; a rotary tool disposed in the vessel and having torque receiving means separably connectable with the output element; and means for separably but non-rotatable coupling the bottom wall to the top wall, said means including at least one projection provided on one 20 of the walls and extending beyond the respective side, and a socket provided in the side of the other of the walls and to receive the projection.

The socket preferably receives the projection in such a way that the vessel can be lifted off the housing.

25 The at least one projection can be provided on the bottom wall of the vessel to extend downwardly into the at least one socket in the upper side of the top wall of the housing. the coupling means may comprise a plurality of substantially equidistant projections and a plurality of substantially equidistant sockets. Each projection is 30 removably received in a discrete socket. Each socket can be bounded by a concave (e.g., substantially hemispherical surface, and each projection can have a complementary convex surface which is adjacent the concave surface in the corresponding socket. The orientation of the convex surface or surfaces on the projection or projections is or 35 can be selected in such a way that the vessel can be rotated, either clockwise or counterclockwise, with reference to the housing (or vice versa) about the axis of rotation of the output element of the prime

mover.

According to another aspect of the invention there is provided a food processor comprising a housing including a top wall; a prime mover disposed in the housing and having a rotary output element 5 extending upwardly through and beyond the top wall; an open-top vessel having a bottom wall to rest on the top wall and having an opening for the output element; a rotary tool provided in the vessel and having a torque-receiving portion separably connectable to the output element; and a turnable cover for the open top of the vessel, the cover 10 including a downwardly extending annular skirt having a plurality of angularly offset first detent elements, the open top having complementary second detent elements to engage the first detent elements in at least one first angular position of the cover with reference to the vessel and the first detent elements in at least one 15 second angular position of the cover.

The skirt can comprise a plurality of downwardly extending lugs or otherwise configurated projections, and the first detent elements can be provided on the lugs, for example, in such orientation that they extend outwardly. The food processor preferably further comprises 20 actuating means (e.g., a depressible knob or pushbutton) which is operatable to start the prime mover, and the cover can be provided which means for preventing the operation of the actuating means in the least one second angular position of the cover, i.e., when the cover is not reliably connected to the open top of the vessel. This reduces the 25 likelihood of injury or of spilling the contents of the vessel because the tool in the vessel cannot be rotated except when the cover is safely secured to the open top of the vessel. The means for preventing the operation of the actuating means in the at least one second angular position of the cover can comprise a downwardly extending arm which is 30 provided on the cover and is outwardly adjacent the vessel, and a releasing element which is provided on and extends from the arm in a direction away from the vessel. The cover can be provided with an annular rim which extends radially outwardly beyond the skirt and comes to rest on the upper edge face at the open top of the vessel when the 35 cover is properly secured, or when the cover is about to be secured, to the vessel. The aforementioned arm is or can be integral with and extends downwardly from the rim of the cover.

The housing can comprise an upright portion the upper part of which is outwardly adjacent the vessel and which can extend all the way to the lower end of the housing, and the actuating means is preferably installed in such upright portion of the housing. The upright portion of the housing can be provided with a slot which receives the releasing means in the at least one first portion of the cover, and the releasing means then enables the actuating means to start the prime mover, e.g., to complete the circuit of an electric motor which constitutes or forms part of the prime mover. In addition, the releasing element can cooperate with the upright portion of the housing to prevent the vessel from being lifted off the top wall of the housing when the cover assumes its at least one first position because the releasing element then acts not unlike a means for coupling the cover to the housing portion and for thus preventing any movement of the vessel with reference to the housing. The releasing element can be slotted (e.g., bifurcated) and, as already mentioned above, the actuating element can include or constitute a depressible knob or pushbutton. When the rim of the cover abuts the open top, the skirt of the cover is preferably confined in the vessel, i.e., the open top of the vessel then surrounds the skirt and is overlapped by the rim of the cover with the arm of the preventing means outwardly adjacent the vessel.

According to yet another aspect of the invention there is provided a food processor comprising a housing having a top wall; a prime mover installed in the housing and having a rotary output element extending upwardly through and beyond the top wall; an open-top vessel including a bottom wall separably coupled to the top wall and having an opening for the output element; a rotary tool provided in the vessel and including torque receiving means separably connected with the output element; and a cover for the open top of the vessel, the cover having an upper side and including a receptacle for a supply of flowable material, the receptacle being provided at the upper side and the cover further having at least one opening for admission of flowable material from the receptacle into the vessel.

The flowable material may for example be oil, salt or pepper to be admixed to the foodstuff or foodstuffs in the vessel. The receptacle can be located substantially centrally of the preferably circular disc-shaped cover and can include an annular sidewall (e.g.,

in the form of a short upright cylinder) which can be grasped by hand to facilitate the placing of the cover onto or the detachment of the cover from the open top of the vessel. That section of the cover which is located beneath the receptacle can include a substantially 5 horizontal central portion and an annular second portion which surrounds and slopes downwardly toward the central portion. The opening or openings are or can be provided in the central portion of such section of the cover.

The cover can further comprise a dome which is surrounded by the 10 receptacle and can receive an upper portion of the tool in the vessel. The top wall of the dome (which can resemble a hollow conical frustum with an open base confronting the bottom wall of the vessel), and the upper portion of the tool in the vessel is normally spaced apart from the top wall of the dome. The top wall of the dome can be provided 15 with at least one aerating port.

According to still another aspect of the invention there is provided a food processor comprising a housing including a top wall; a prime mover installed in the housing and having a rotary output element extending upwardly through and beyond the top wall; a vessel 20 having an open top and a bottom wall separably and non-rotatable couplable to the top wall, the bottom wall having an opening and the output element extending into the vessel by way of the opening; a rotary tool provided in the vessel and having torque receiving means separably connectable to the output element; a turnable cover for the 25 open top of the vessel, the open top having an internal annular shoulder and the cover having a downwardly extending annular skirt resting on the shoulder; and means separably to connect the cover to the vessel including at least two internal protuberances provided on the open top above the shoulder and at least two external protuberances 30 provided on the skirt, the internal protuberances overlying the external protuberances in at least one predetermined angular position of the turnable cover with reference to the vessel.

The height of each external protuberance can equal or approximate the distance between the internal shoulder and the internal 35 protuberances of the open top of the vessel. Preferably the open top of the vessel has four protuberances which are equidistant from each other in the circumferential direction of the annular shoulder. The

number of external protuberances can be less (e.g., three) than the number of internal protuberances.

According to still another aspect of the invention there is provided a food processor comprising a housing having a top wall; a prime mover installed in the housing and having a rotary output element extending upwardly through and beyond the top wall; a vessel including a bottom wall separably and non-rotatable coupleable to the top wall and having an opening for the output element; and a rotary tool in the vessel, the tool including an upright hollow tubular holder having a closed upper end, at least one knife provided on the holder, and torque receiving means provided in the holder and separably connectable to the output element.

The torque receiving means can be rigid with and can extend downwardly from the closed upper end of the holder, and the upper end portion of the rotary output element can have a non-circular cross-sectional outline to be non-rotatable received in a complementary socket or hole of the torque receiving means. The closed upper end of the holder for the knife of the tool can include an upwardly projecting extension (such as the aforementioned upper portion of the tool) which is received in and is centred by the dome of the cover for the open top of the vessel. The extension can include a substantially disc-shaped portion and a pointed tip extending upwardly from the disc-shaped portion. The top wall of the dome is normally spaced apart from the tip of the extension. If the torque receiving means of the tool is axially movably mounted on the upper portion of the output element, the top wall of the dome can serve as a means for limiting the extent of axial movability of the torque receiving means with reference to the output element.

According to yet another aspect of the invention there is provided a food processor comprising a hollow upright substantially cylindrical housing having a top wall and an open lower end; a vessel including a bottom wall separable from and non-returnably coupled to the top wall, the bottom wall having an opening; an electric motor installed in the housing and having a rotary output element extending upwardly through the top wall and through the opening of the bottom wall into the vessel; a rotary tool provided in the vessel and including a torque receiving portion separably connectable with the

output element; and a closure fro the open lower end of the housing.

The closure is preferably provided with a lateral extension and with a rim which abuts the housing from below. The closure can be provided with a plurality of windows which are formed in and also 5 extend radially inwardly beyond the rim. The closure may also comprise a plurality of (e.g., two) upright guide members or ducts each of which registers with one of the windows and extends into the housing and has a top portion adjacent a boss at the underside of the top wall of the housing. The food processor may further comprise fastener means 10 securing the top portions of the guide members to the top wall of the housing. The top portions of the guide members can be provided with holes which register with tapped holes in the respective bosses at the underside of the top wall, and each fastener then comprises a head beneath the top portion of the respective guide member and an 15 externally threaded shank which extends upwardly through the hole of the adjacent top portion and into the respective tapped hole.

The food processor can be further provided with a complementary male and female detent means which are adjacent the lateral extension of the closure and serve to releasable secure the closure to the 20 housing.

The aforementioned upright portion of the housing has an open end for the manually displaceable element of the actuating means and an open lower end overlying the extension of the closure for the open lower end of the housing. As already mentioned above, the upright 25 portion can be provided with a slot which is outwardly adjacent the vessel and can receive the releasing element of the means for preventing operation of the actuating means for the electric motor except when the cover assumes a predetermined angular position (or one of two or more predetermined angular positions) with reference to the 30 vessel.

The food processor may further comprise a cable which serves to connect the motor with a source of electrical energy. A portion of the cable is or can be located at the closure, and the underside of the aforementioned extension of the closure can be provided with a pair of channels one of which can receive a short portion of cable, and with a 35 partition between the channels. Still further, the closure can be provided with a substantially annular cable-receiving channel which

communicates with the channels at the underside of the extension of the closure. The latter can comprise a main panel or base plate which is rigid (e.g., integral) with the extension, and a second panel which is disposed beneath and is preferably separably secured to the main panel.

5 A portion of the substantially annular channel extends between the underside of the main panel and the marginal portions of the second panel. The main panel can be provided with a recess which communicates with the annular channel, and a portion of the cable extends through the recess into the housing and is connected to the motor or to the

10 controls of the motor.

The closure can be provided with a plurality of downwardly extending legs, e.g., legs made from an elastomeric material. Portions of the legs can extend into pockets which are provided in the main panel of the closure adjacent the rim.

15 The food processor may thus be a so-called mini food processor, which can be produced and assembled at a fraction of the cost heretofore known food processors. The vessel for the foodstuffs is or can be mounted directly on top of the housing of the electric motor or other prime mover.

20 The safety device can be simpler and less expensive than, but just as reliable as, heretofore known safety devices serving to prevent untimely starting of the prime mover.

25 The cover, in addition to serving as a means for properly closing and sealing the vessel for one or more foodstuffs when the appliance is in actual use, can also perform at least one additional desirable and important function.

30 The food processor can be designed to prepare mayonnaise and/or other eligible substances wherein metered quantities of a first ingredient must be added to one or more additional ingredients while the additional ingredients undergo treatment in the vessel.

Preferably the food processor can be rapidly taken apart for cleaning or storage of its constituents and can be rapidly reassembled preparatory to renewed use.

35 The food processor can be eye-pleasing and compact and can be designed in such a way that the person in charge can observe the condition of foodstuffs in the vessel during each and every stage of processing.

The invention is diagrammatically illustrated by way of example in the accompanying drawings, in which:-

Figure 1 is a perspective view of one embodiment of a food processor according to the invention;

5 Figure 2 is an enlarged partly elevational and partly central vertical sectional view of the upper portion of the food processor in Figure 1;

Figure 3 is an exploded perspective view of the food processor of Figure 1;

10 Figure 4 is a bottom plan view of the food processor of Figure 1;

Figure 5 is an enlarged partly elevational and partly vertical sectional view of the closure for the open lower end of the housing of the food processor of Figure 1; and

15 Figure 6 is a top plan view of the closure but with the electric cable removed.

The drawing shows only those components of the improved food processor which are necessary for a complete understanding of the invention. For 5 example, the drawing does not show the details of the electric circuit of a prime mover PM, preferably a relatively small electric motor) which is installed in a substantially cylindrical upright housing 10. Moreover, the drawing does not show all details of 10 the operative connection between a depressible knob or pushbutton 16 and the on-off switch for the prime mover PM. All such components which are not specifically shown in the drawing but are desirable or necessary for proper operation of the food processor are or can 15 be identical with the corresponding parts of available food processors, for example, a food processor known as "MINIPRO" which is distributed by the assignee of the present application.

The fully assembled food processor comprises 20 four discrete main units or components which are shown, separated from each other, in FIG. 3. These units or components include the aforementioned housing 10 for the prime mover PM, a bowl-shaped vessel 30, a rotary tool 38, and a cover or lid 45. When the 25 food processor is ready for use, the bottom wall 31 (FIG. 2) of the vessel 30 rests on and is non-rotatably but separably coupled to the top wall 12 of the housing 10, the tool 38 is non-rotatably but axially movably and separably mounted on the upper 30 end portion of an upright rotary output element or shaft 29 of the prime mover PM, and the cover 45 overlies the open top 47 of and is separably connected to the vessel 30. In addition, a slotted releasing element 53 of a means (52) for preventing the afore- 35 mentioned depressible knob 16 from starting the prime

mover PM then extends into a substantially horizontal slot 15 in the upper part 14 of an upright portion 13 of the housing 10. This ensures that the element 53 frees or releases the knob 16 for downward movement to a position in which the circuit of the prime mover PM is completed so that the output shaft 29 rotates the tool 38 and its knife or knives 37, and the knife or knives comminute and/or otherwise treat one or more foodstuffs which are confined in the vessel 10 30 beneath the properly applied and secured cover 45. The arrangement is preferably such that the circuit of the prime mover PM remains completed as long as the knob 16 is maintained in depressed position. Depending upon the nature of the foodstuff or food-stuffs in the vessel 30, the operator may decide to 15 repeatedly operate the prime mover PM at short intervals, to start the comminuting of material in the vessel 30 by repeatedly depressing the knob 16 for short intervals of time and to thereupon maintain 20 the knob in depressed position for a longer interval of time, or to rely on any other combination of treatments. However, it is equally within the purview of the invention to employ a circuit which remains completed in response to a first depression 25 of the knob 16 and is interrupted in response to the next-following depression of the knob.

The lower end of the housing 10 is open and is closed by a detachable closure 17 the details of which are shown in FIGS. 4, 5 and 6. The housing 10 30 can be made of a single piece of suitable plastic material and, in addition to the aforementioned upright portion 13, includes a substantially cylindrical wall 11 the lower edge face of which abuts a radially outwardly extending rim 18 of the closure 17. This 35 housing confines the prime mover PM as well as all

electrical and electronic parts of the circuit of the prime mover. The upper part 14 of the upright portion 13 of the housing 10 extends well above the horizontal top wall 12, and this upright portion 13 is 5 hollow to receive a motion transmitting member (not shown) which can actuate the on-off switch for the prime mover PM in response to depression of the knob 16. The latter is accessible to a finger of the operator by being installed in the open upper end of 10 the upright portion 13. The lower end of the upright portion 13 is also open and overlies a lateral extension 24 of the closure 17. For example, the on-off switch in the housing 10 can comprise a fixed contact and a movable contact which is stressed and 15 tends to move away from the fixed contact. When the knob 16 is depressed, the aforementioned motion transmitting member in the hollow upright portion 13 of the housing 10 shifts the movable contact against the fixed contact to thereby complete the circuit of 20 the prime mover PM as long as the knob 16 remains in depressed position. The upper part 14 of the upright housing portion 13 further contains a blocking element which prevents depression of the knob 16 (e.g., by extending into a notch of the motion 25 transmitting member) when the releasing element 53 does not extend into the slot 15. Introduction of the releasing element 53 into the slot 15 entails a disengagement of the blocking element from the motion transmitting member so that the latter can be moved 30 downwardly in response to depression of the knob 16 to thus complete the circuit of the prime mover PM. The releasing element 53 is mounted on or is an integral part of the cover 45 and can enter the slot 15 only when the cover is properly affixed to the open 35 top 47 of the vessel 30 and is maintained in a

predetermined (first) angular position or is maintained in one of two or more predetermined (first) angular positions with reference to the vessel 30.

The slot 15 is substantially L-shaped and 5 extends into two mutually inclined walls of the upper part 14 of the upright housing portion 13. This enables the releasing element 53 to enter the slot 15 in response to turning of the cover 45 in a counterclockwise direction (as viewed in FIG. 1 or 3) 10 and to leave the slot in response to turning of the cover 45 in a clockwise direction. This enables the operator to readily ascertain that the cover 45 has assumed the angular position which is necessary to permit depression of the knob 16 as soon as the 15 releasing element 53 strikes the internal surface of the upright portion 13 and prevents further counterclockwise turning of the cover 45.

The means for separably coupling the bottom wall 31 of the vessel 30 to the top wall 12 of the 20 housing 10 comprises four equidistant projections 32 at the underside of the bottom wall 31 and four equidistant sockets 27 in the upper side of the top wall 12. Each socket 27 is bounded by a concave (e.g., substantially hemispherical) surface, and each 25 projection 32 can constitute a flat lug extending in the circumferential direction of the vessel 30 and having a convex surface which is adjacent or actually abuts the concave surface in the adjacent socket 27 when the walls 12 and 31 are properly coupled to each other, 30 e.g., when the underside of the wall 31 is free to come to rest on the flat part of the upper side of the wall 12. The vessel 30 can be simply lifted off the housing 10 when the cover 45 is detached from the open top 47 of the vessel 30 or when the cover is 35 maintained in an angular position in which the

releasing element 53 does not extend into the slot 15. Proper introduction of each projection 32 into one of the sockets 27 is necessary in order to enable the releasing element 53 to enter the slot 15, i.e., 5 the bottom wall 32 must be closely adjacent the top wall 12, the cover 45 must overlie the open top 47 of the vessel 30, and the releasing element 53 must extend into the slot 15 before the knob 16 can be depressed to complete the circuit of the prime 10 mover PM. On the other hand, the coupling means 27, 32 do not interfere with lifting of the vessel 30 (with or without the cover 45) off the housing 10 (normally for the purpose of evacuating the contents of the vessel and for subsequent cleaning) as long 15 as the releasing element 53 is located outside of the slot 15.

The number of sockets 27 and projections 32 can be reduced or increased without departing from the spirit of the invention. Moreover, the number 20 of sockets 27 can exceed the number of projections 32, and the projections 32 can extend upwardly beyond the upper side of the major part of the top wall 32 if the sockets 27 are provided in the underside of the bottom wall 31. The utilization of projections with 25 convex surfaces and of sockets which are bounded by concave surfaces is desirable and advantageous because the vessel 30 can be properly coupled to the housing 10 by turning the vessel in a clockwise or in a counterclockwise direction in order to cause each 30 projection 32 to enter a discrete socket 27. As can be seen in FIG. 3, one of the sockets 27 is inwardly adjacent the upper part 14 of upright portion 13 of the housing 10. The radii of curvature of convex surfaces on the projections 32 preferably equal or 35 approximate the radii of curvature of concave surfaces

bounding the sockets 27.

An important advantage of the improved food processor is that the illustrated coupling between the top wall 12 of the housing 10 and the bottom wall 5 31 of the vessel 30 is much simpler and less expensive than, but just as reliable as, heretofore known couplings which include tongue-and-groove connections. Moreover, the improved coupling including the projections 32 and the sockets 27 can be manipulated 10 to establish a non-rotatable but separable connection between the walls 12 and 31 by starting from any one of a practically infinite number of different starting positions of the housing 10 and vessel 30 relative to each other. It is not necessary to employ lateral 15 slides and/or analogous parts which are constituents of conventional couplings. Still further, the parts 27 and 32 of the improved coupling can be formed in simple molds or shaped by resorting to available tools and machines. It is presently preferred to employ a 20 coupling wherein the projections 32 are integral parts of the respective wall 12 or 31 and the sockets 27 are formed in the exposed side of the other wall at the time the vessel 30 or the housing 10 is being made in a plastic processing machine.

25 An additional advantage of the improved coupling is that the projections 32 can be introduced into the sockets 27 with a minimum of effort irrespective of whether the vessel 30 is simply moved downwardly so that the projections immediately enter the sockets or 30 whether the projections 32 first abut the flat portion of the upper side of the top wall 12 and the operator must thereupon turn the vessel in order to move the projections into the nearest sockets. The amount of friction between the lowermost points of convex 35 surfaces on the projections 32 and the upper side of

the top wall 12 is negligible. Moreover, it merely involves a lifting of the vessel 30 off the housing 10 if the operator wishes to detach the vessel for the purpose of evacuating its contents onto a plate or 5 boards into a pot, into a pan, or into another container, and such lifting can take place as soon as the releasing element 53 on the cover 45 is detached from the upright portion 13 of the housing 10 irrespective of whether or not the cover 45 is 10 lifted off the open top 47 of the vessel.

The central portion of the top wall 12 is formed with an upwardly extending bearing sleeve 28 for an intermediate portion of the output shaft 29. The bearing sleeve 28 is receivable in an open-ended 15 sleeve 33 which forms part of and extends upwardly from the bottom wall 31 of the vessel 30. As can be seen in FIG. 2, the uppermost portion of the output shaft 29 extends beyond the central opening of the sleeve 33 so that it can transmit torque to a torque 20 receiving portion 41 extending downwardly from the closed upper end 62 of a tubular knife holder 40 forming part of the tool 38.

The output shaft 29 can receive torque directly from the rotor of the prime mover PM in the 25 housing 10. Alternatively, the output element 29 can receive torque from a step-down transmission having an input element which receives torque from a pinion on a shaft that is directly driven by the rotor of the prime mover PM. The transmission prevents 30 rotation of the tool 38 at an excessive speed. If employed, the transmission is installed in the housing 10 beneath the top wall 12. The details of the direct or indirect connection between the output shaft 29 and the rotor of the prime mover PM form no part of 35 the present invention. The uppermost portion of the

output shaft 29 has a non-circular cross-sectional outline and extends into a complementary socket in the torque receiving portion 41 of the holder 40. For example, the peripheral surface of the uppermost 5 portion of the output shaft 29 can be provided with one or more axially parallel flutes which receive complementary ribs on the internal surface of the torque receiving portion 41 so that the holder 40 and its portion 41 can be readily slipped onto or off 10 the output shaft 29 as soon as the cover 45 is detached from the open top 47 of the vessel 30.

The vessel 30 and the cover 45 are preferably made of a suitable light-transmitting (transparent or translucent) plastic material to permit observation 15 of treatment of one or more foodstuffs in the interior of the vessel when the prime mover PM is on. The inner diameter of the sleeve 33 matches or slightly exceeds the outer diameter of the bearing sleeve 28 so that the vessel 30 is properly centered when the 20 sleeve 28 extends into the sleeve 33. The upper end of the sleeve 33 is preferably located at a level only slightly below the open top 47 of the vessel 30; this reduces the likelihood of penetration of food-stuffs into the sleeve 33 (and thence out of the 25 vessel 30) when the food processor is in use. This is particularly important when the vessel 30 contains one or more liquid or liquefiable substances such as water, oil, butter, margarine and/or others.

The uppermost portion 34 of the cylindrical 30 sidewall of the vessel 30 is somewhat thinner than the main portion of this sidewall so that the vessel is provided with an annular internal shoulder 35 which can serve as a rest for the downwardly extending annular skirt 48 at the underside of the cover 45. More 35 specifically, the shoulder 35 can serve as an abutment

for external protuberances or detent elements 50 which are provided at the lower ends of lugs 49 forming part of and extending downwardly beyond the skirt 48. The skirt 48 cooperates with the thin 5 uppermost portion 34 of the sidewall of the vessel 30 to properly center the cover 45 with reference to the open top 47 of the vessel. At such time, a radially outwardly extending rim 46 of the cover 45 overlies the upper edge face of the open top 47. 10 The rim 46 extends radially outwardly beyond and at right angles to the skirt 48.

The external detent elements or protuberances 50 of the cover 45 can cooperate with adjacent internal protuberances or detent elements 36 which 15 are provided at the inner side of the uppermost portion 35 of the cylindrical sidewall of the vessel 30 and are spaced apart from the shoulder 35. The height of the protuberances 50 equals or closely approximates the distance of the shoulder 35 from the 20 undersides of the protuberances 36. Thus, when the protuberances 50 abut and are caused to slide along the shoulder 35, they can move to positions in which they are overlapped by and can actually engage the protuberances 36 to thereby separably connect or lock 25 the cover 45 to the open top 47 of the vessel 30.

At the same time, the releasing element 53 is received in the slot 15 to ensure that the knob 16 can be depressed. Entry of the releasing element 53 into the slot 15 is possible only when the bottom 30 wall 31 is properly coupled to the top wall 12 and when the cover 45 is properly connected to the vessel 30.

The illustrated food processor comprises four equidistant internal protuberances 36 and three 35 external protuberances 50. The mutual spacing of

protuberances 50 is such that when one of these protuberances is properly overlapped by a protuberance 36, each other protuberance 50 is also overlapped by one of the protuberances 36. The 5 mutual spacing of the four protuberances 36 (in the circumferential direction of the uppermost portion 34 of the sidewall of the vessel 30) is  $90^\circ$ , the same as the mutual spacing of the protuberances 50.

10 The illustrated tool 38 comprises two knives 37 which are disposed substantially diametrically opposite each other with reference to the axis of the tubular holder 40 and are located at different levels, i.e., at different distances from the open lower 15 axial end of the holder 40. This enhances the comminuting action of the tool 38. Each knife 37 is preferably made from a single piece of a suitable metallic material and can resemble a sickle having a sharp cutting edge at the convex side. The hafts 20 of the knives 37 are embedded in the adjacent lower portion 39 of the holder 40 which can be made of a suitable plastic material. The lower portion 39 of the holder 39 is thicker than the upper portion to ensure reliable retention of the radially innermost 25 portions of the knives 37 therein. The illustrated knives 37 are disposed in planes which are inclined with reference to the plane of the bottom wall 31 of the vessel 30 when the holder 40 is properly mounted on the exposed uppermost portion of the output 30 shaft 29. The diameter of the cylindrical internal chamber 61 of the holder 40 equals or only slightly exceeds the outer diameter of the sleeve 33 to thus ensure that the tool 38 is not likely to wobble in the vessel 30 when the prime mover PM is on. The closed 35 upper end 62 of the holder 40 has a slightly convex

upper side and is integral with the downwardly extending torque receiving portion 41 which is axially movably slipped onto the output shaft 29. Thus, the form-locking connection between the output shaft 29 5 and the torque receiving portion 41 is such that the entire tool 38 is free to move up and down but cannot rotate with reference to the output shaft 29.

The upper portion of the tool 38 constitutes an upward extension of the holder 40 and includes a 10 cylindrical shank 42 carrying a disc-shaped portion 43 which, in turn, carries a pointed tip 44. The disc-shaped portion 43 can be used as a handle to facilitate the attachment of the torque receiving portion 41 to or its detachment from the output 15 shaft 29. The upper end portion of the pointed tip 44 is or can be rounded, and the entire extension 42-44 is receivable in a centrally located hollow frustoconical dome 58 of the cover 45 in such a way that the tool 38 has a certain limited freedom of axial movement 20 relative to the output shaft 29. This is desirable and advantageous in connection with the comminuting of certain types of foodstuffs which would be likely to become wedged between the knives 37 and the upper side of the bottom wall 31 to damage or deform the 25 knives if the holder 40 were not free to move up and down in the interior of the vessel 30. The extent of upward movement of the tool 38 in the vessel 30 is limited by the substantially flat horizontal top wall 59 of the dome 58. The top wall 59 has one more 30 aerating or venting ports 60. When the vessel 30 is empty and the food processor is maintained in upright position (e.g., on top of a table or counter), the tool 33 descends by gravity to assume its lower end position in which the pointed tip 44 of its 35 extension 42-44 is spaced apart from the top wall

59 of the dome 58.

The cover 45 can be made of the same (preferably light-transmitting) material (particularly a plastic material) as the vessel 5 30. This substantially disc-shaped cover has a generally circular outline, and its central portion is further provided with a receptacle 54 having a relatively short cylindrical sidewall 55 spacedly surrounding the hollow frustoconical dome 58 the 10 open base of which confronts the bottom wall 31 of the vessel 30 when the cover is properly affixed to the open top 47 of the vessel.

That section of the cover 45 which is located beneath the receptacle 54 includes a substantially 15 flat horizontal central portion which is integral with the adjacent portion of the dome 53, and a substantially frustoconical annular portion 56 which surrounds and slopes downwardly toward the central portion.

The latter is provided with one or more openings 57 20 which establish communication between the interior of the receptacle 54 and the interior of the vessel

39. The receptacle 54 can receive a supply of flowable material (e.g., oil) which is to be admitted, at a controlled rate, into the vessel 30 while the 25 latter contains another foodstuff which is to be intimately mixed with the flowable material. For example, the receptacle 54 can receive a supply of oil if the vessel 30 is used for the making of mayonnaise.

All other ingredients of mayonnaise are confined in the 30 vessel 30, and the oil is admitted at a rate which is determined by the cross-sectional area or areas of the opening or openings 57 in the flat central portion of the cover section within the confines of the sidewall 55. The latter can be used as a handle to facilitate 35 turning of the cover 45 with reference to the open top

47 of the vessel 30.

The aforementioned means 52 for preventing depression of the knob 16 when the cover 45 is not properly affixed to the vessel 30 further comprises 5 an elongated supporting arm 51 which is integral with and extends downwardly from the rim 46 of the cover at the outer side of the vessel 30. The lower end portion of the arm 51 carries the releasing element 53 at the exact level of the slot 15 in the upper 10 part 14 of upright portion 13 of the housing 10 when the bottom wall 31 of the vessel 30 is properly coupled to the top wall 12 of the housing 10 and the cover 45 is properly affixed to the open top 47 of the vessel. The releasing element 53 can 15 constitute an integral outwardly extending lower end portion of the arm 51. This releasing element extends radially outwardly and away from the adjacent portion of the vessel 30 and at right angles to the arm 51.

20 The number of openings 57 in the central section of the cover 45 can be reduced to one or increased to three or more. All that counts is to ensure that the combined cross-sectional area of all openings 57 enables the flowable material in 25 the receptacle 54 to enter the vessel 30 at a desired rate. Each such opening 57 is preferably provided in the lowermost portion of the central section of the cover 45. The configuration of the central section of the cover beneath the receptacle 30 54 can depart from the configuration which is shown in FIG. 2.

The details of the closure 17 for the open lower end of the housing 10 are shown in FIGS. 4, 5 and 6. This closure is preferably made of a plastic 35 material and has a substantially circular outline

save for the provision of the extension 24 which is located below the open lower end of the upright housing portion 13. The rim 18 of the closure 17 is adjacent the lower edge face of the wall 11, and this 5 rim has two cutouts or windows 20 which extend inwardly into the main section or panel 117 of the closure and are spaced apart from one another in the circumferential direction of the housing 10. The windows 20 register with elongated upwardly extending 10 ducts or guide members 62A each of which has a top portion 71 provided with a hole 72 in register with a tapped blind hole in one of two bosses 64 (FIG. 2) at the underside of the top wall 12. The elongated channels 70 in the guide members 62A serve to guide 15 the externally threaded shanks and heads of threaded fasteners 21 which are applied by a screwdriver or an analogous rudimentary tool and serve to separably secure the closure 17 to the top wall 12. When the shanks of the fasteners 21 are driven home, their 20 heads are located beneath the top portions 71 of the respective guide members 62A.

In addition to the fasteners 21, the means for separably securing the closure 17 to the housing 10 comprises at least one set of male and female 25 detent members which can engage each other by snap action. FIGS. 5 and 6 show a male detent member 73 which is provided on and extends upwardly from the extension 24 and has a pallet serving to snap into a complementary socket in the lower part of the housing 30 portion 13. The separable connection between the housing 10 and the closure 17 can comprise two or more male detent members and an equal number of complementary female detent members.

The underside of the extension 24 is formed 35 with two spaced-apart substantially parallel channels

25 which are separated from each other by a partition  
26. The inner ends of the channels 25 communicate  
with an annular channel 22 which, in turn, communicates  
with the interior of the housing 10 by way of a  
5 recess 63 in the main section or panel 117 of the  
closure 17. An electric cable 66 has a first end  
portion (not shown) with bare conductor terminals  
connected to the electrical control means for the  
prime mover PM in the housing 10, and a second end  
10 portion provided with a customary plug (not shown)  
for connection to a wall outlet or to any other  
suitable energy source, e.g., to an extension cord  
if the outlet is remote from the cable 66. An  
intermediate portion of the cable 66 can be convoluted  
15 around a downwardly extending portion of the main  
panel 117 to be snugly confined in the annular  
channel 22, and a further portion of the cable 66  
extends into one of the channels 25 in the underside  
of the extension 24. This ensures that the underside  
20 of the closure 17 can come to rest flat against a  
support, such as the top of a table or a counter.  
The channel 22 is partially overlapped by a second  
panel or plate 23 which is separably connected to the  
main panel 117 by four pairs of male and female detent  
25 members. The male detent members are shown in FIGS.  
5 and 6, as at 67. The recess 63 in the main panel  
117 is in line with the lower end of an elongated  
guide 65 for that portion of the cable 66 which  
extends from the annular channel 22 to the control  
30 means for the prime mover PM in the housing 10. The  
guide 65 can have a U-shaped cross-sectional outline  
and its open side is or can be adjacent the internal  
surface of the wall 11.

The width of the channels 25 at the  
35 underside of the extension 24 is preferably selected

in such a way that the cable portion in the selected channel 25 is clamped and held against accidental extraction. If desired, the width of one of the channels 25 can exceed the width of the other 5 channel 25 so that the closure 17 can be used in conjunction with cables 66 having different diameters.

FIGS. 5 and 6 show a disc 69 of rubber or other elastomeric material which is located at the inner or upper side of the main panel 117 and is 10 contacted by one or more parts of the prime mover PM. A second elastic disc (not specifically shown) is installed at the underside of the top wall 12 so that the prime mover PM is confined between two elastically deformable discs.

15 The closure 17 further comprises several preferably equidistant legs 19 which can be made of an elastomeric material and have portions extending into recesses or pockets 68 provided therefor in the underside of the main panel 117. The dimensions of 20 the legs 19 are selected in such a way that their upper portions must be deformed in order to enter into and to be reliably retained in the respective pockets 68.

The provision of two channels 25 having 25 different widths is desirable and advantageous if the food processor is likely to be furnished with different types of electric cables 66. Thus, an electric cable which is normally used in a particular country or in a particular group of countries could not be introduced 30 into one of the channels 25 but can be reliably held in the other channel 25. On the other hand, one of these channels 25 might be too wide for a different cable whereas such different cable is a tight fit in the other channel.

35 The depth of the annular channel 22 can be

selected in such a way that it can receive one, two or more convolutions of the cable 66, depending upon the length of that cable portion which would remain loose when the prime mover PM is connected with an 5 energy source. Such loose cable portion could cause accidents or unintentional detachment of the plug at the free end of the cable from the energy source. The height of the annular channel 22 is preferably such that the convoluted portion of the cable 66 is 10 held therein with a certain amount of friction.

The improved food processor is operated in the following way:

Referring again to FIG. 3, the first step preferably involves coupling the bottom wall 31 of 15 the vessel 30 with the top wall 12 of the housing 10 in such a way that the vessel can be lifted off but cannot turn with reference to the housing. This is accomplished by introducing each of the four equidistant projections 32 at the underside of the 20 bottom wall 31 into a discrete socket 27 in the upper side of the top wall 12. If the bottom wall 31 is initially oriented in such a way that the lowermost portions of convex surfaces of the projections 32 abut the flat part of the upper side of the top wall 25 12, the vessel 30 is simply turned until the projections 32 enter the adjacent sockets 27.

The next step involves attachment of the tool 38 to the output shaft 29 of the prime mover PM. Thus, the tool 38 is inserted into the vessel 30 in 30 such a way that the holder 40 surrounds the sleeve 33 of the bottom wall 31 and the holder is thereupon turned until the orientation of the tool 38 is such that the exposed uppermost portion of the output shaft 29 can enter the socket in the torque receiving 35 portion 41. The food processor is then ready to

receive one or more foodstuffs which are introduced into the vessel 30 from above to partially fill the space around the holder 40. The cover 45 is thereupon affixed to the open top 47 of the vessel 30.

- 5 This involves introduction of the skirt 48 into the thin-walled uppermost portion 34 of the cylindrical sidewall of the vessel 30 until the rim 46 comes to rest on the upper edge of the open top 47. The cover 45 is then turned in a counterclockwise direction
- 10 until the releasing element 53 at the lower end of the arm 51 enters the slot 15 of the upright housing portion 13 to release the aforesdiscussed motion transmitting member extending from the knob 16 to the on-off switch in the housing 10. At such time,
- 15 each internal protuberance 36 of the vessel 30 overlies an external protuberance 50 of the skirt 48, i.e., the cover 45 cannot be simply lifted off the vessel 30 until and unless the cover is first turned in a clockwise direction to extract the releasing
- 20 member 53 from the slot 15 and to move the protuberances 50 out of and away from the slots between the shoulder 35 and the internal protuberances 36 of the vessel 30.

The plug at the exposed end of the cable 66 is then inserted into an outlet or into the socket of an extension cord and the food processor is ready for use, i.e., the prime mover PM is started in automatic response to depression of the knob 16 and preferably remains on as long as the knob 16 is compelled to dwell in the depressed position. As mentioned above, it is often desirable (in connection with the comminution of a large majority of foodstuffs which are expected to be treated in the vessel 30) to repeatedly depress the knob 16 for short intervals of time so that the prime mover PM is repeatedly started and arrested to produce several short-lasting comminuting

actions upon the batch of material which is confined in the vessel 30 and is overlapped by the cover 45. Once the material has been subjected to two or more short-lasting comminuting and mixing actions of the 5 knives 37, the knob 16 can be maintained in depressed position until the material in the vessel 30 assumes a desired optimum consistency. The mixing and comminuting actions of the knives 37 can be observed at all times because the vessel 30 and the cover 45 10 are preferably made of a light-transmitting material. The stressing of the aforesubscribed movable contact forming part of the on-off switch for the prime mover PM in the housing 10 is sufficiently pronounced to ensure that the switch opens in automatic response to 15 termination or interruption of pressure upon the knob 16.

The improved food processor can be used with particular advantage for comminuting parsley, onions, garlic, fruits, carrots and/or other vegetables, lean 20 meat, nuts (such as hazelnuts and peanuts) without shells, cheese, chocolate, biscuits, pieces of bread and many other types of foodstuffs. In addition, the food processor can be used for the preparation of baby foods, mayonnaise and other edible substances which 25 contain two or more intimately intermixed ingredients. If the appliance is used for the making of mayonnaise, oil which is to be mixed with other ingredients is first introduced into the receptacle 54 and is caused to drip into the vessel 30 by way of openings 57 in 30 the cover section beneath the receptacle.

The illustrated food processor is or can be designed for use in domestic households rather than in restaurants and other establishments which prepare and process large quantities of foods. 35 For example, the vessel 30 can be designed to accept

up to 20 grams of parsley, up to 100 grams of peeled and partially comminuted onions, up to five standard-sized cloves of garlic, up to 60 grams of lean meat, up to 200 grams of peeled, cored and sliced apples, 5 up to 150 grams of peeled and partially comminuted carrots, one biscuit (rusk) at a time, up to 40 grams of cooled and fragmented chocolate, up to 40 grams of parmesan or another cheese which is introduced in the form of cubes or otherwise configurated 10 fragments, up to 100 grams of hazelnuts or up to 100 grams of peanuts. These are merely examples of foodstuffs and quantities of foodstuffs which can be safely comminuted and mixed in the vessel of the improved food processor.

15 The appliance which is shown in the drawing is susceptible of many additional modifications without departing from the spirit of the invention. For example, the means for coupling the bottom wall 31 of the vessel 30 to the top wall 12 of the housing 20 can be modified in a number of ways such as by changing the number of sockets 27 and the number of projections 32 or by interchanging the positions of the sockets and projections. Moreover, the illustrated tool 38 can be replaced with any one of a wide variety of 25 different tools, e.g., with a tool having a single knife 37 or with a tool having more than two knives which may but need not resemble sickles. All that counts is to ensure that the utilized tool will be provided with a torque receiving portion which 30 can be readily attached to and detached from the output shaft 29 and that the selected tool be preferably provided with an extension (corresponding to the extension 42-44 of the illustrated tool 38) which can properly center the tool with reference to 35 the cover 45 and can cooperate with the cover to

limit the extent of axial movability of the tool in the vessel.

CLAIMS

1. A food processor comprising a housing including a top wall having an upper side; a prime mover disposed in the housing and having a rotary output element extending through and upwardly beyond the top wall; a food-receiving vessel having a bottom wall adjacent the top wall, the bottom wall having an opening for the output element and an underside adjacent the upper side; a rotary tool disposed in the vessel and having torque receiving means separably connectable with the output element; and means for separably but non-rotatable coupling the bottom wall to the top wall, said means including at least one projection provided on one of the walls and extending beyond the respective side, and a socket provided in the side of the other of the walls and to receive the projection.
- 15 2. A food processor according to claim 1, wherein the tool comprises at least one knife and the bottom wall has an upwardly extending open-ended sleeve which defines the opening, the prime mover comprising an electric motor and the at least one projection being provided on and extending downwardly beyond the underside of the bottom wall.
- 20 3. A food processor according to claim 1, wherein the coupling means comprises a plurality of substantially equidistant projections and a plurality of substantially equidistant sockets, each of the projections being removably received in a discrete socket.
- 25 4. A food processor according to claim 1, wherein the other wall has a concave surface bounding the at least one socket and the at least one projection has a complementary convex surface adjacent the concave surface when the at least one projection extends into the at least one socket.
- 30 5. A food processor comprising a housing including a top wall; a prime mover disposed in the housing and having a rotary output element extending upwardly through and beyond the top wall; an open-top vessel having a bottom wall to rest on the top wall and having an opening for the output element; a rotary tool provided in the vessel and having a

5 torque-receiving portion separably connectable to the output element; and a turnable cover for the open top of the vessel, the cover including a downwardly extending annular skirt having a plurality of angularly offset first detent elements, the open top having complementary second detent elements to engage the first detent elements in at least one first angular position of the cover with reference to the vessel and the first detent elements in at least one second angular position of the cover.

10 6. A food processor according to claim 5, wherein the skirt comprises a plurality of downwardly extending lugs and the first detent elements are provided on the lugs, and further comprising actuating means operable to start the prime mover, the cover having means for preventing the operation of the actuating means in the at least one second angular position.

15 7. A food processor according to claim 6, wherein the means for preventing the operation of the actuating means comprises a downwardly extending arm provided on the cover and outwardly adjacent the vessel, and a releasing element provided away from the vessel.

20 8. A food processor according to claim 5, wherein the cover has a rim extending radially outwardly of the skirt, and further comprising actuating means operable to start the prime mover and means for preventing operation of the actuating means in the at least one second position of the cover, the means including an arm provided on the rim and a releasing element provided on the arm, the housing having a portion outwardly adjacent the vessel and provided with a slot for the releasing element, the actuating means being provided in said portion of the housing and being operable to start the prime mover when the releasing element extends into the slot and the releasing element extending into the slot in the at least one first position of the cover.

25 30 35 9. A food processor according to claim 8, wherein the releasing element is slotted.

10. A food processor according to claim 8, wherein the actuating means comprises a depressible knob.

11. A food processor according to claim 8, wherein the rim abuts the 5 open top and the skirt is received in the said vessel.

12. A food processor comprising a housing having a top wall; a prime mover installed in the housing and having a rotary output element extending upwardly through and beyond the top wall; an open-top vessel 10 including a bottom wall separably coupled to the top wall and having an opening for the output element; a rotary tool provided in the vessel and including torque receiving means separably connected with the output element; and a cover for the open top of the vessel, the cover having an upper side and including a receptacle for a supply of 15 flowable material, the receptacle being provided at the upper side and the cover further having at least one opening for admission of flowable material from the receptacle into the vessel.

13. A food processor according to claim 12, wherein the receptacle is 20 located substantially centrally of the cover and includes an annular sidewall which can be grasped by hand to facilitate placing of the cover onto and detachment of the cover from the open top of the vessel.

14. A food processor according to claim 13, wherein the cover 25 includes a section beneath the receptacle, the section including a central portion and an annular second portion surrounding and sloping downwardly toward the central portion, the at least one opening being provided in the central portion.

30 15. A food processor according to claim 12, wherein the cover further comprises a dome which is surrounded by the receptacle, the tool including an upper portion extending into the dome.

35 16. A food processor according to claim 15, wherein the dome includes a top wall and the upper portion of the tool is spaced apart from the top wall.

17. A food processor according to claim 15, wherein the dome is a hollow conical frustum having an open base confronting the bottom wall of the vessel.

5 18. A food processor according to claim 15, wherein the dome has a top wall and at least one aerating port is provided in the top wall.

10 19. A food processor comprising a housing including a top wall; a prime mover installed in the housing and having a rotary output element extending upwardly through and beyond the top wall; a vessel having an open top and a bottom wall separably and non-rotatable couplable to the top wall, the bottom wall having an opening and the output element extending into the vessel by way of the opening; a rotary tool provided in the vessel and having torque receiving means separably connectable to the output element; a turnable cover for the open top of the vessel, the open top having an internal annular shoulder and the cover having a downwardly extending annular skirt resting on the shoulder; and means separably to connect the cover to the vessel including at least two internal protuberances provided on the open top above the shoulder and at least two external protuberances provided on the skirt, the internal protuberances overlying the external protuberances in at least one predetermined angular position of the turnable cover with reference to the vessel.

15 20. A food processor according to claim 19, wherein each of the external protuberances has a predetermined height and the internal protuberances are spaced apart from the shoulder a distance equal to or approximating the predetermined height.

20 21. A food processor according to claim 19, wherein the open top has four internal protuberances which are equidistant from each other in the circumferential direction of the annular shoulder.

25 22. A food processor comprising a housing having a top wall; a prime mover installed in the housing and having a rotary output element extending upwardly through and beyond the top wall; a vessel including a bottom wall separably and non-rotatable couplable to the top wall

and having an opening for the output element; and a rotary tool in the vessel, the tool including an upright hollow tubular holder having a closed upper end, at least one knife provided on the holder, and torque receiving means provided in the holder and separably connectable to the 5 output element.

23. A food processor according to claim 22, wherein the torque receiving means is rigid with and extends downwardly from the closed upper end portion having a non-circular cross sectional outline and the 10 torque receiving means has a socket which can non-rotatably receive the upper end portion of the output element.

24. A food processor according to claim 22, wherein the closed upper end has an upwardly projecting extension and the vessel has an open 15 top, and further comprising a cover for the open top of the vessel, the cover having a dome receiving the extension of the closed upper end.

25. A food processor according to claim 24, wherein the extension includes a substantially disc-shaped portion and a pointed tip 20 extending upwardly from the disc-shaped portion, the dome having a top wall which is spaced apart from the tip.

26. A food processor according to claim 24, wherein the torque receiving means is axially movably mounted on the output element and 25 the dome includes a top wall which limits the extent of axial movability of the torque receiving means.

27. A food processor comprising a hollow upright substantially cylindrical housing having a top wall and an open lower end; a vessel 30 including a bottom wall separable from and non-returnably coupled to the top wall, the bottom wall having an opening; an electric motor installed in the housing and having a rotary output element extending upwardly through the top wall and through the opening of the bottom wall into the vessel; a rotary tool provided in the vessel and 35 including a torque receiving portion separably connectable with the output element; and a closure for the open lower end of the housing.

28. A food processor according to claim 27, wherein the closure comprises a lateral extension and a rim to abut the housing from below, the closure having a plurality of windows provided in and extending radially inwardly of the rim.

5

29. A food processor according to claim 28, wherein the closure further comprises a plurality of hollow upright guide members each to register with one of the windows, extending into the housing and each having a top portion adjacent the top wall, and further comprising 10 fastener means to secure the top portions to the top wall.

30. A food processor according to claim 29, wherein the top portions have holes and the top wall has tapped holes in register with the holes of the top portions, the fastener means having externally threaded 15 shanks extending through the holes of the top portions and into the tapped holes.

31. A food processor according to claim 27, further comprising complementary male and female detent means adjacent the lateral 20 extension releasably to secure the closure to the housing.

32. A food processor according to claim 27, wherein the housing further includes a substantially upright portion above the lateral extension, the upright portion having an open upper end and an open 25 lower end overlying the extension, and further comprising actuating means operable to start the motor, the actuating means being provided in the upright portion and including a manually displaceable element at the open upper end of the upright portion.

30 33. A food processor according to claim 32, wherein the upright portion has a slot and further comprising means to prevent operation of the actuating means including a releasing element movable into and from the slot to permit the operation of the actuating means when received in the slot.

35

34. A food processor according to claim 32, further comprising a cable to connect the motor to a source of electrical energy, the cable

including a portion beneath the closure and the extension having an underside provided with a pair of channels to receive the cable and a partition between the channels.

5 35. A food processor according to claim 34, wherein the closure further includes a substantially annular cable-receiving channel which communicates with the channels at the underside of the extension.

10 36. A food processor according to claim 35, wherein the closure further comprises a main panel which is rigid with the extension and a second panel disposed beneath and separably secured to the main panel, the annular channel including a portion between the panels.

15 37. A food processor according to claim 36, wherein the main panel has a recess which communicates with the annular channel, the cable including a portion extending from the motor in the housing and downwardly through and beyond the recess.

20 38. A food processor according to claim 27, wherein the closure has a plurality of downwardly extending legs.

39. A food processor according to claim 38, wherein the closure further comprises pockets and the legs have portions extending into the pockets.

25 40. A food processor substantially as hereinbefore described and illustrated with reference to the accompanying drawings.